US007683750B1

(12) **United States Patent**
Yu

(10) **Patent No.: US 7,683,750 B1**
(45) **Date of Patent: Mar. 23, 2010**

(54) **WARNING DEVICE FOR CIRCUIT BREAKER**

(76) Inventor: **Tsung Mou Yu**, No. 4, Alley 2, Lane 23, Sec. 3, Pa Te Road, Panchiao, Taipei (TW)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **12/423,011**

(22) Filed: **Apr. 14, 2009**

(51) **Int. Cl.**
H01H 71/04 (2006.01)

(52) **U.S. Cl.** **337/79**; 337/66; 200/314

(58) **Field of Classification Search** 200/314; 337/37, 66, 79
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

2,496,759	A *	2/1950	Warsher	337/76
4,056,816	A *	11/1977	Guim	340/638
4,342,979	A *	8/1982	Phillips	337/41
4,630,020	A *	12/1986	Yang	337/79
4,633,240	A *	12/1986	Guim et al.	340/638
4,768,025	A *	8/1988	Vila-Masot	340/638
5,012,495	A *	4/1991	Munroe et al.	337/3
5,079,530	A *	1/1992	Tsuchiyama	335/17
5,157,369	A *	10/1992	Yao	337/68
5,491,460	A *	2/1996	Krasser et al.	337/70
5,541,569	A *	7/1996	Jang	337/68
5,760,672	A *	6/1998	Wang	337/79
5,889,457	A *	3/1999	Hsu et al.	337/59
6,057,751	A *	5/2000	Hung et al.	337/377
6,249,209	B1 *	6/2001	Yu	337/37
6,252,490	B1 *	6/2001	Lin	337/79
6,275,133	B1 *	8/2001	Chen	337/37
6,275,134	B1 *	8/2001	Chen	337/37
6,307,459	B1 *	10/2001	Yu	337/37
6,335,500	B1 *	1/2002	Chi et al.	200/341
6,377,158	B1 *	4/2002	Yu	337/37
6,445,273	B1 *	9/2002	Yu	337/37
6,445,275	B2 *	9/2002	Yu	337/68
6,456,185	B1 *	9/2002	Yu	337/37
6,512,441	B1 *	1/2003	Yu	337/37
6,542,061	B2 *	4/2003	Santa Cruz et al.	337/79
6,552,643	B2 *	4/2003	Chen	337/66
6,552,644	B2 *	4/2003	Yu	337/66
6,563,414	B2 *	5/2003	Yu	337/66
6,570,480	B1 *	5/2003	Huang	337/79
6,674,034	B1 *	1/2004	Wang	200/341
7,230,516	B2 *	6/2007	Yu	337/66
7,336,149	B2 *	2/2008	Ullermann	337/66
2006/0186984	A1 *	8/2006	Ullermann	337/14
2009/0251836	A1 *	10/2009	Jonsson	361/93.1

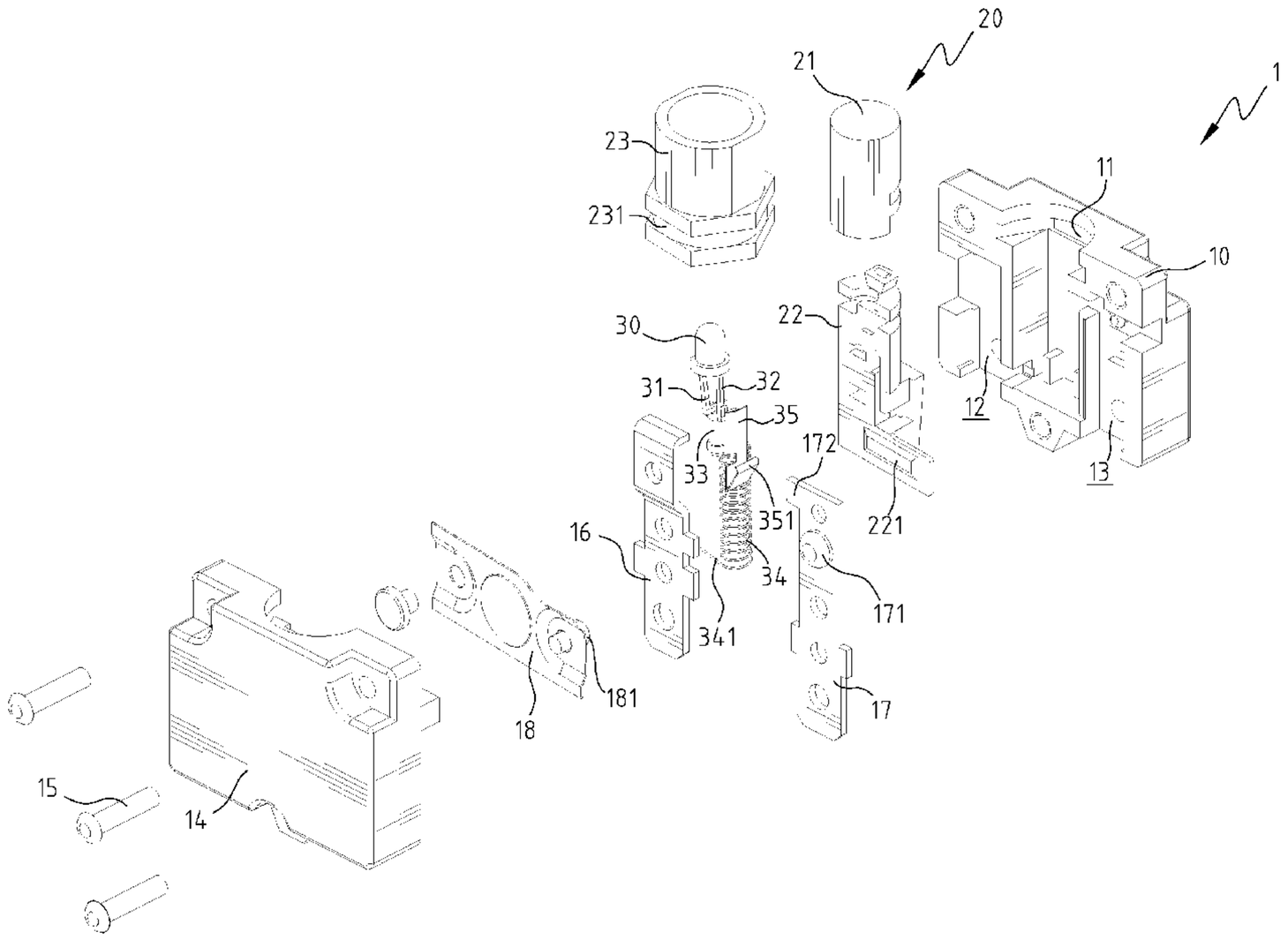
* cited by examiner

Primary Examiner—Ross N Gushi

(57) **ABSTRACT**

A warning device for a circuit breaker includes a casing with a button and a warning light is received in the button. The button is movable relative to the casing and made of transparent or translucent material. When the main circuit is connected, the warning light is not activated. When overheat or overload, the main circuit is cut off and a weak current circuit is formed to light up the warning light.

9 Claims, 9 Drawing Sheets



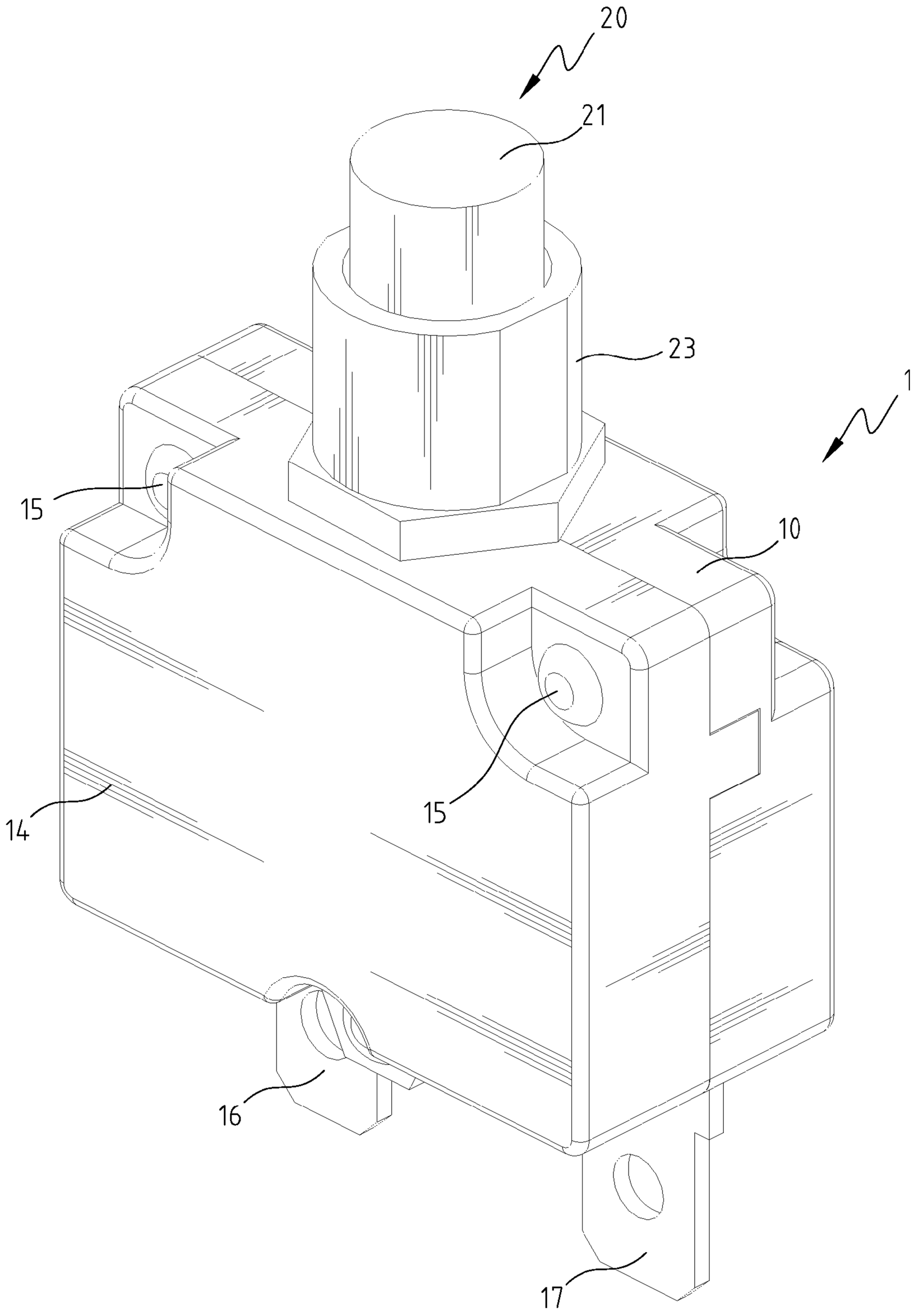


FIG. 1

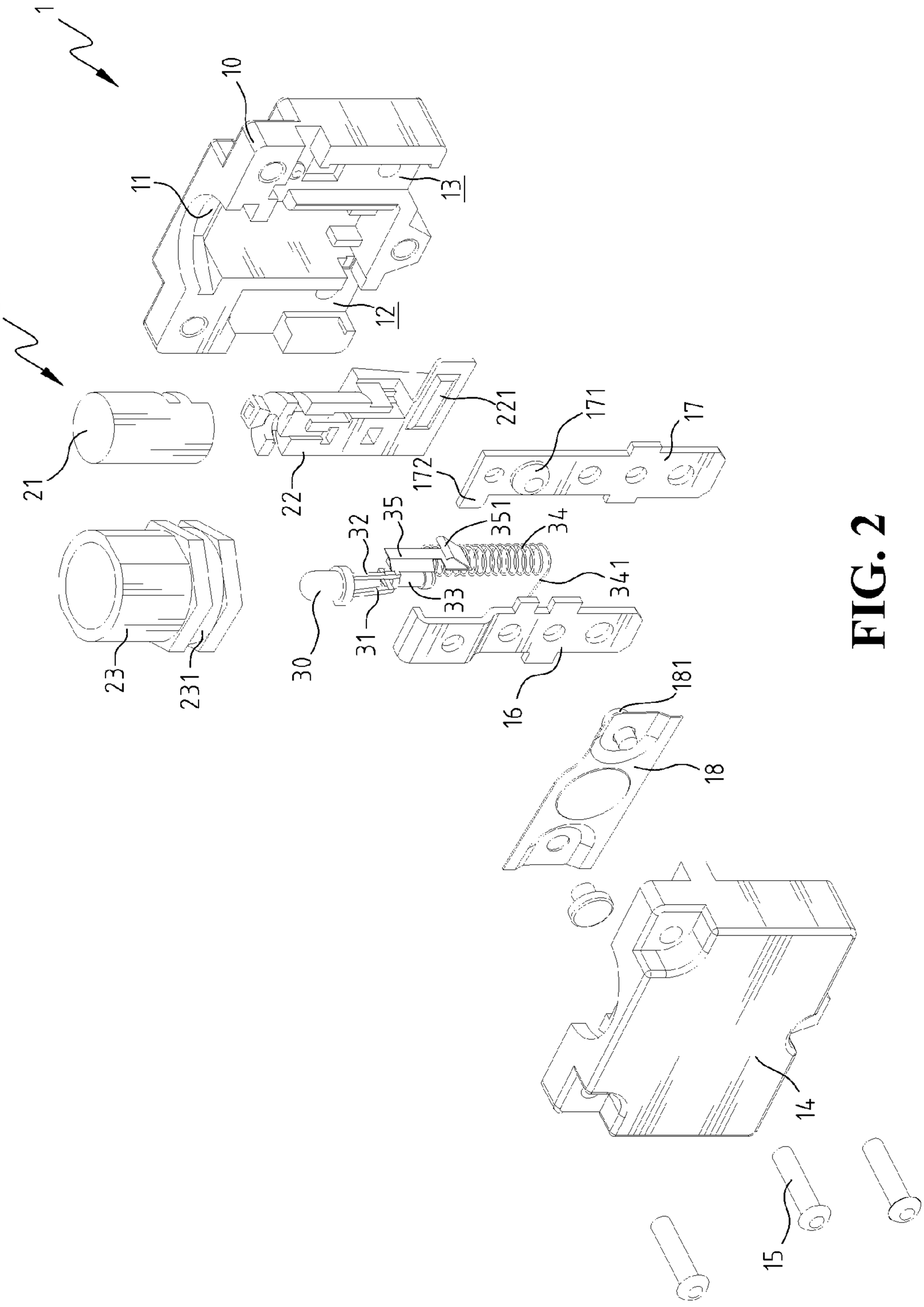

1
10
11
13
12
20
21
221
22
171
17
172
32
35
351
34
341
33
31
30
23
231
16
181
18
14
15

FIG. 2

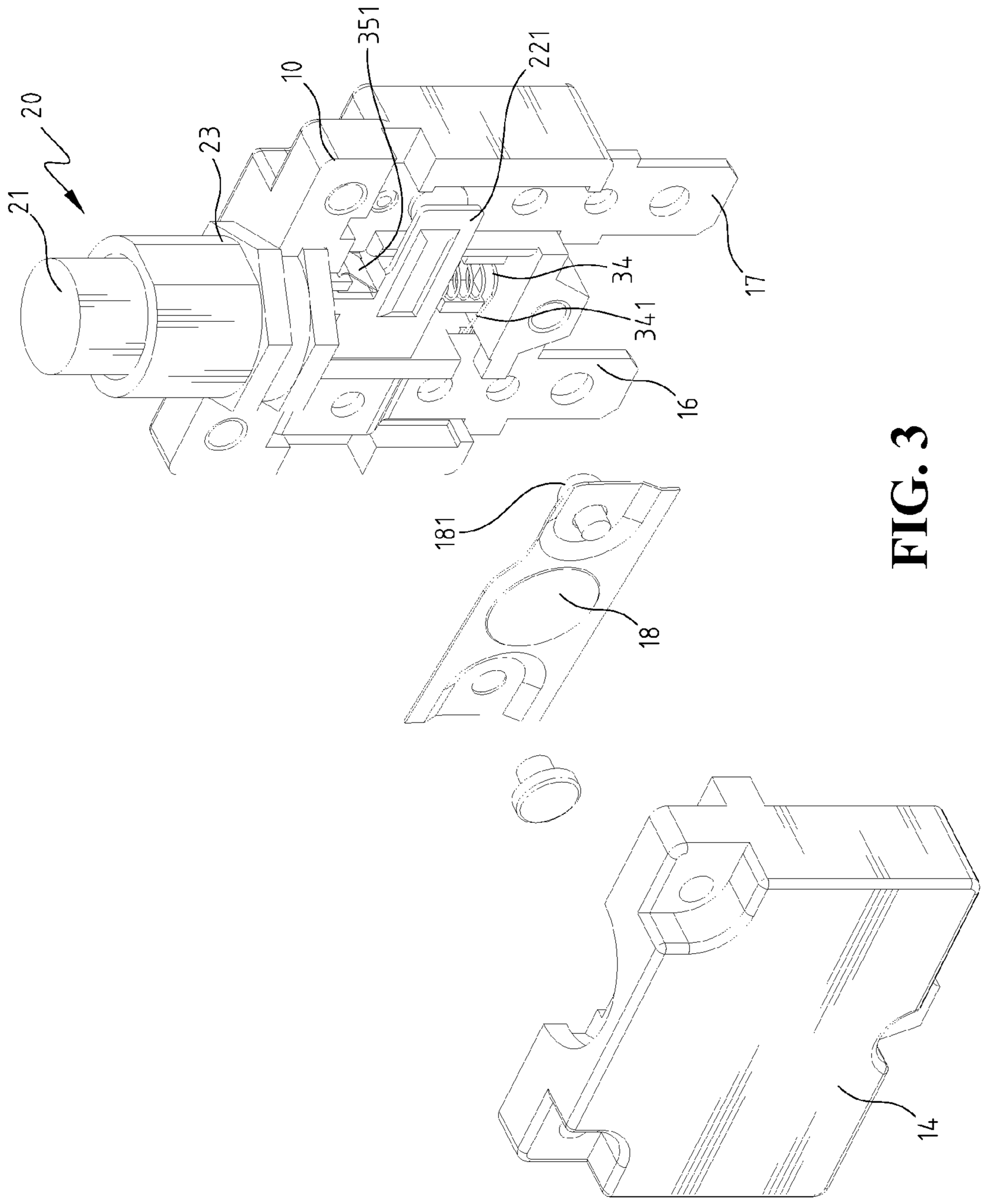


FIG. 3

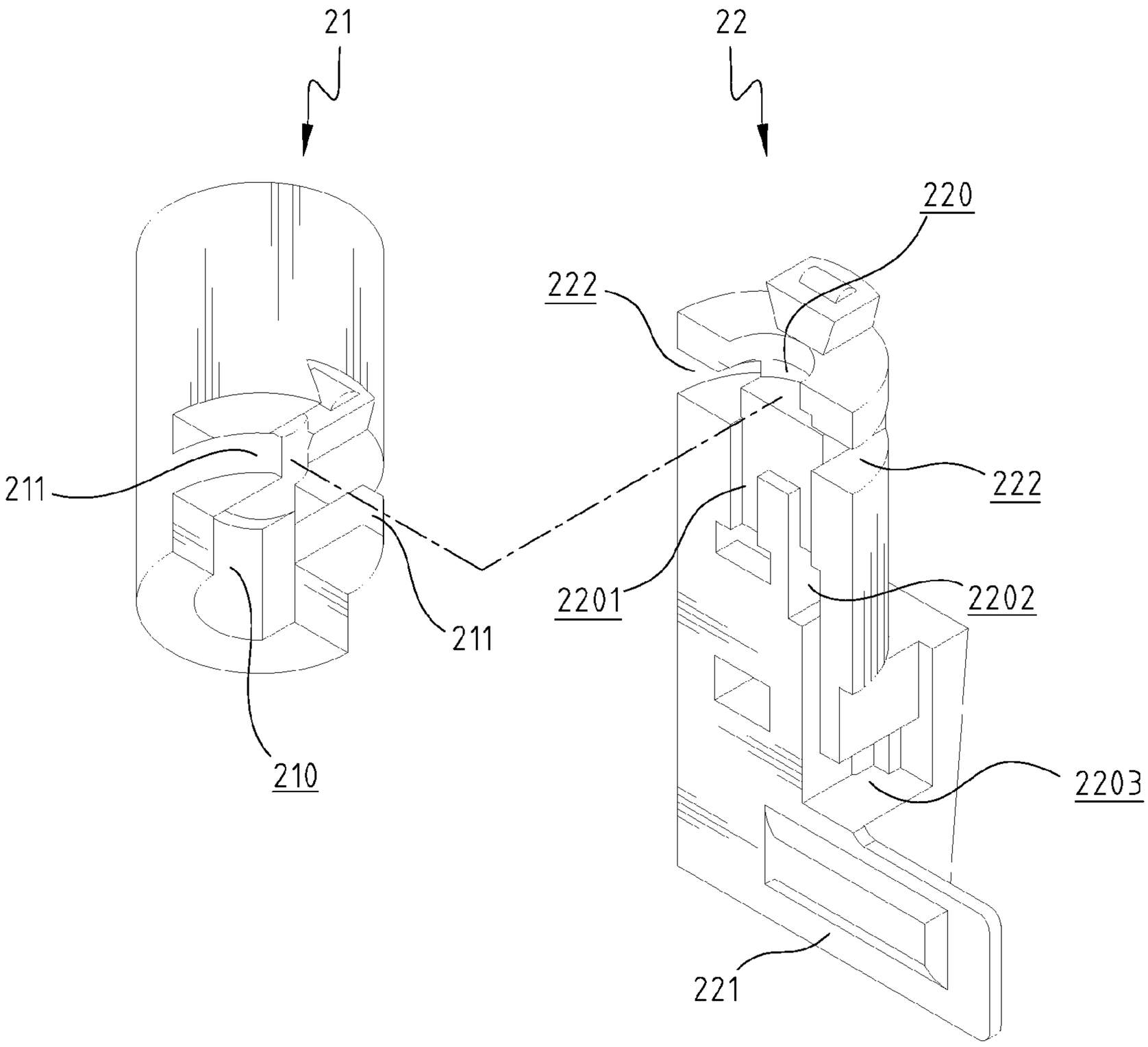


FIG. 4

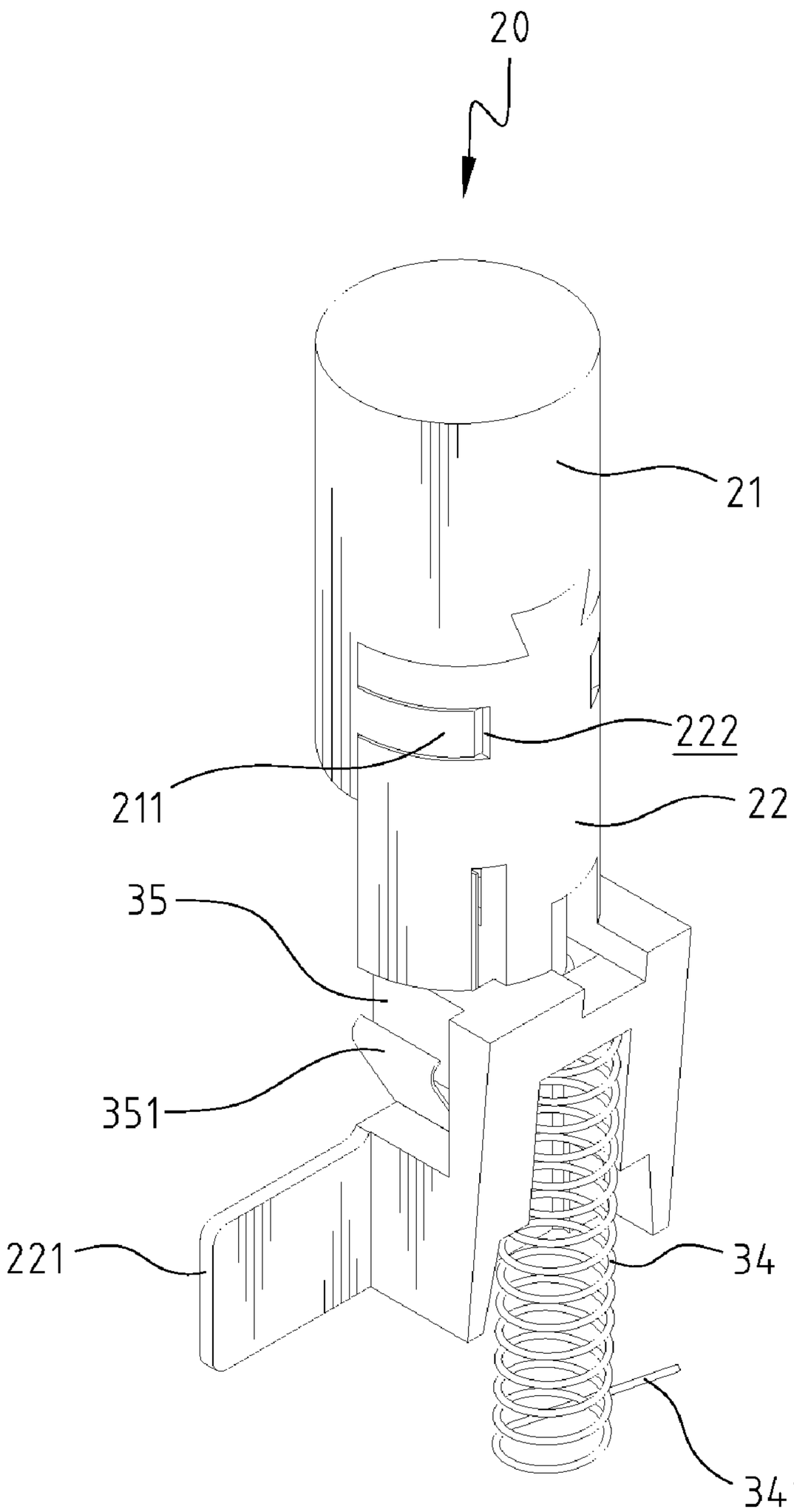


FIG. 5

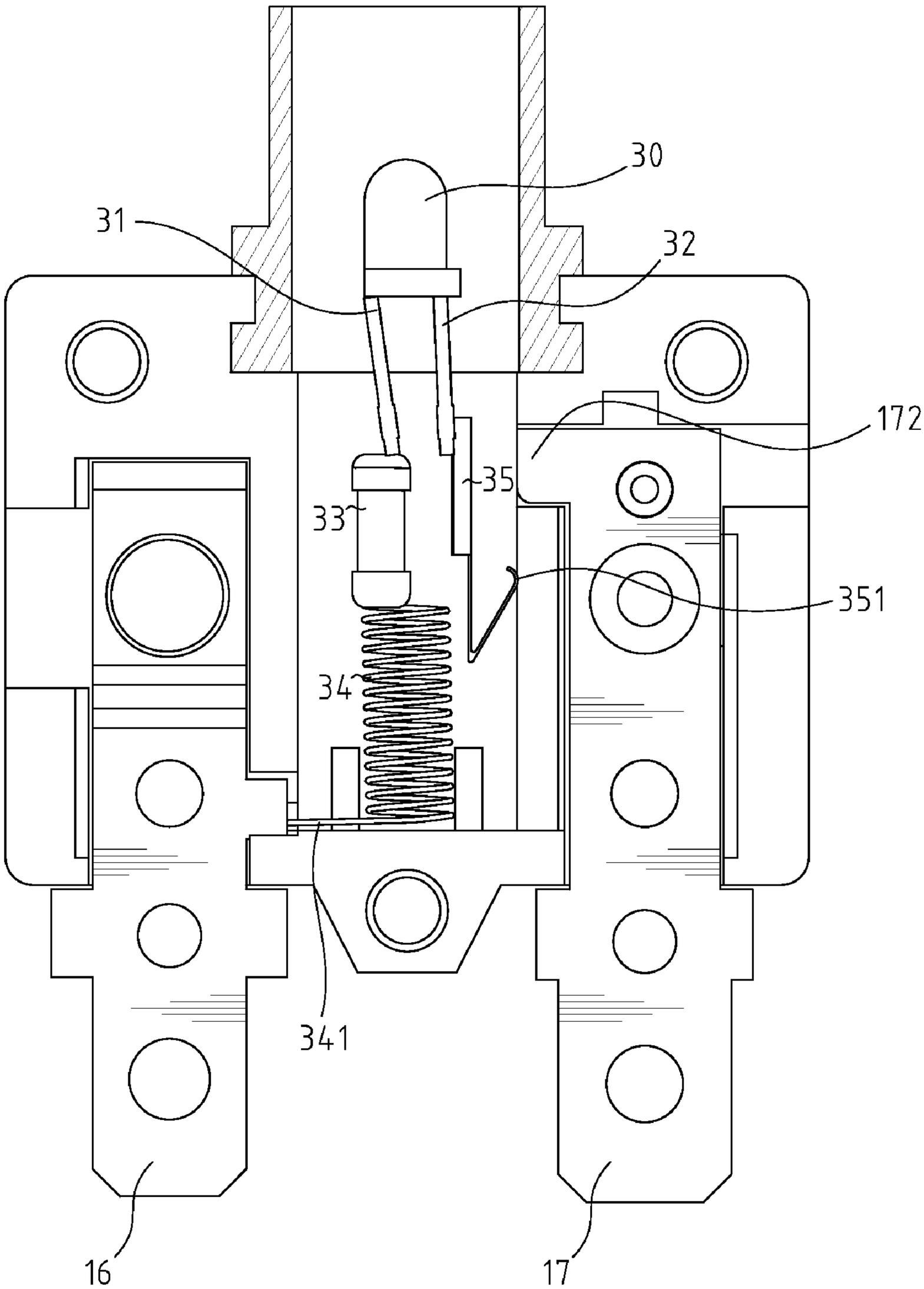


FIG. 6A

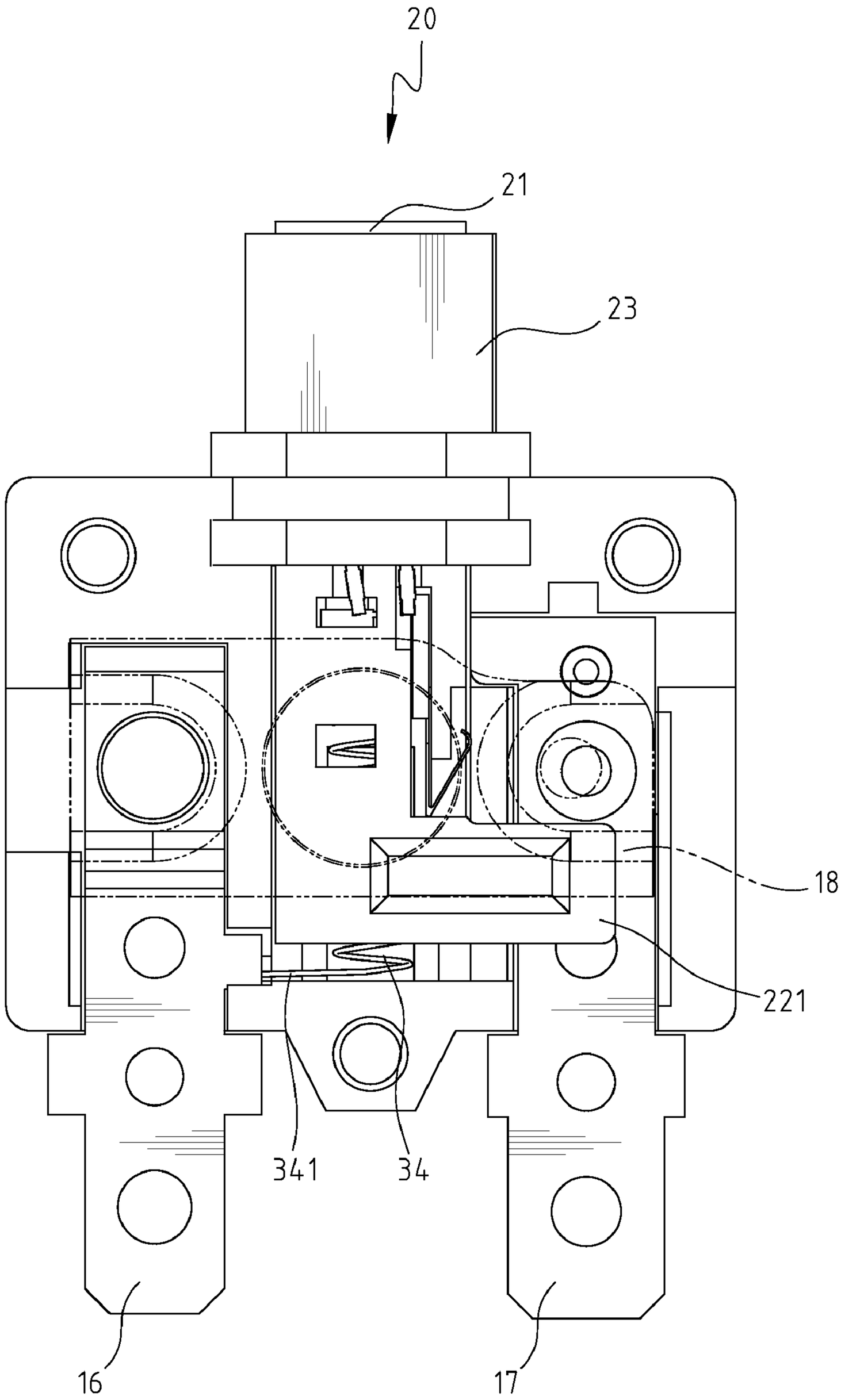


FIG. 6B

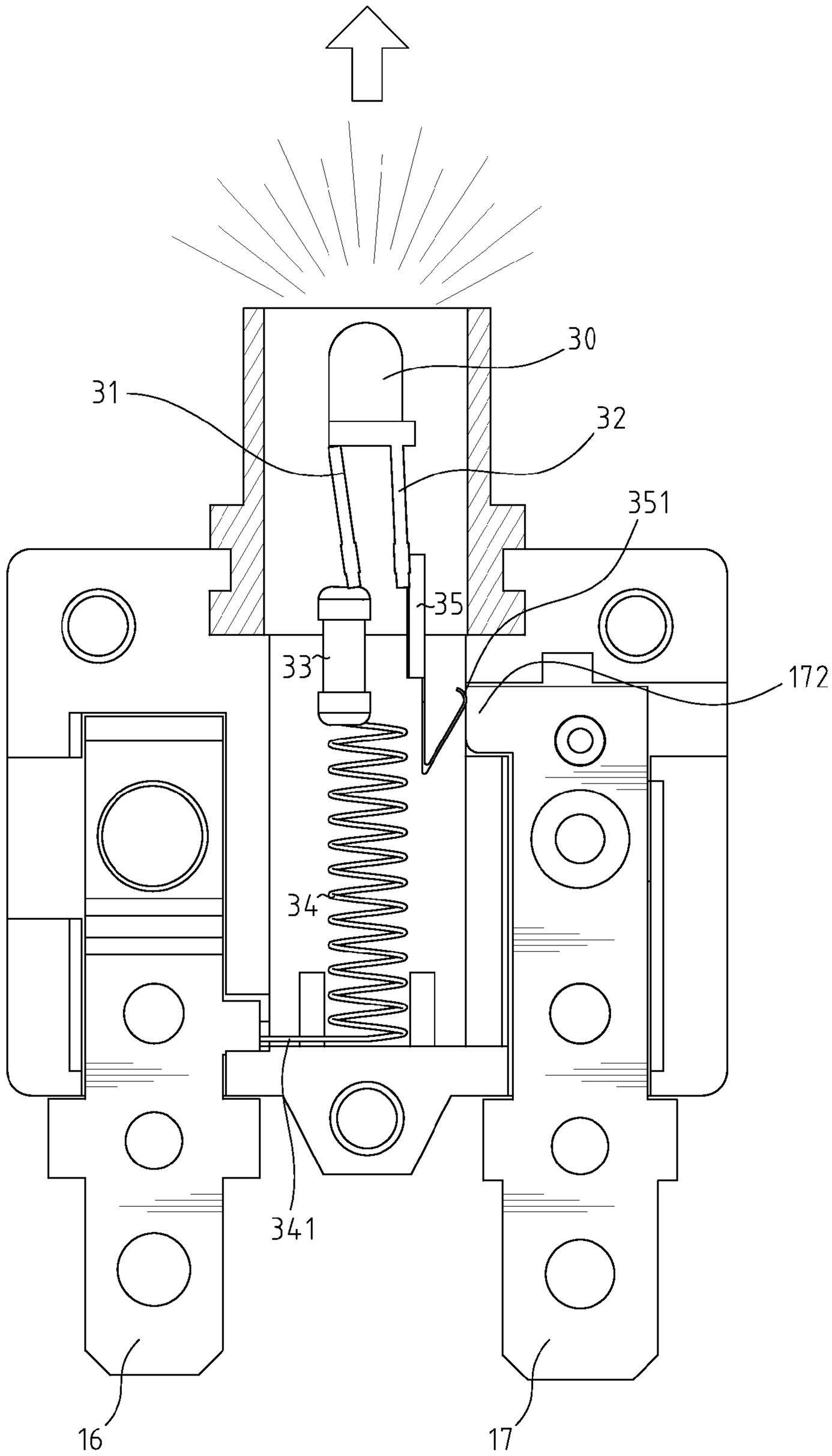


FIG. 7A

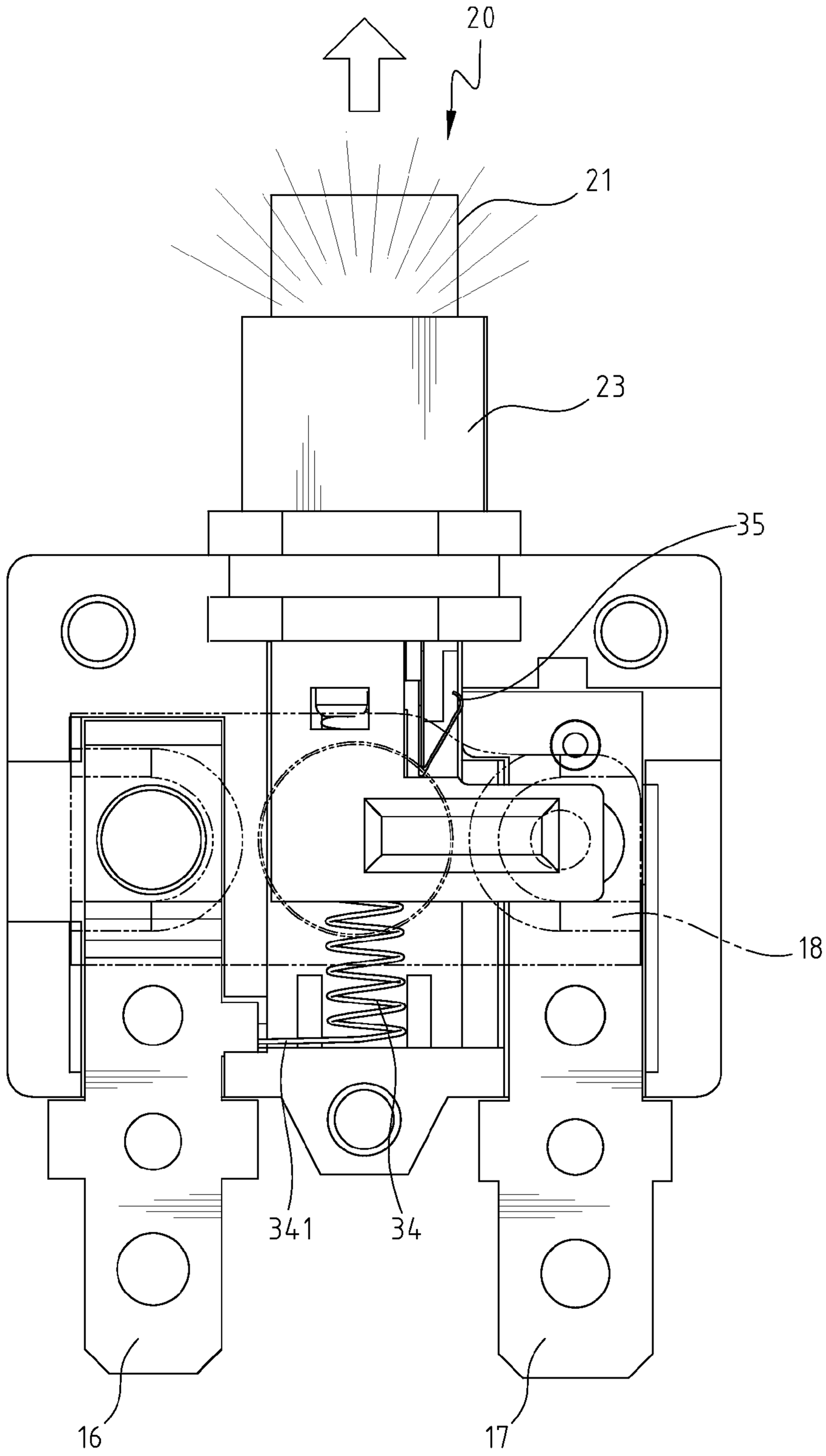


FIG. 7B

WARNING DEVICE FOR CIRCUIT BREAKER

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates generally to a warning device for a circuit breaker, and in particular to a warning device to inform the users about the circuit being cut off by activating a warning light.

2. The Prior Arts

A conventional circuit breaker generally includes a bi-metallic plate which bends toward one direction during over-flow of the current so as to separate two contact points to cut off the circuit to protect the electric appliance from being burned.

The first shortcoming of the conventional circuit breaker is that it lacks a warning device to inform the users that the circuit is in abnormal status. The conventional circuit breaker can only cut off the circuit but the users cannot tell which appliance is not in function. The second shortcoming of the conventional circuit breaker is that if there are multiple circuits are involved and one of which is cut off, the users have to spend significant time to figure out which circuit is cut off.

Therefore it is necessary to provide a warning device for the circuit breaker to overcome the disadvantages of the conventional circuit breaker.

SUMMARY OF THE INVENTION

A primary objective of the present invention is to provide a warning device to solve the inherent shortcoming that the users cannot tell which circuit or appliance is in trouble and there will be not any obvious signal can be provided to inform the situation about the situation.

A warning device for a circuit breaker according to the present invention includes a casing, a button connected to the casing and a warning light received in the button. The button is movable relative to the casing and made of transparent or translucent material. When the main circuit is connected, the warning light is not activated. When overheat or overflow, the main circuit is cut off and a weak current circuit is formed to light up the warning light to inform the users that the main circuit is cut off.

One of advantages of the present invention is that the circuit of the warning light is not connected when the main circuit of the appliance is in "ON" status. Only when the main circuit for the appliance is cut off, the circuit of the warning light is connected to emit the light.

Another advantage of the present invention is that the warning light lights up to inform the users which main circuit is cut off so that the users can quickly remove the problems. The warning device is especially helpful when it is used in multiple circuits. The warning light lights up to inform which circuit is cut off. The users do not need to check the circuits one by one and saves time and have easy management.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention will be apparent to those skilled in the art by reading the following detailed description of a preferred embodiment thereof, with reference to the attached drawings, in which:

FIG. **1** is a perspective view showing a warning device for a circuit breaker in accordance with the present invention;

FIG. **2** is an exploded view to show the warning device in accordance with the present invention;

FIG. **3** is an exploded view to show the bi-metallic plate and the warning device of the present invention;

FIG. **4** is an exploded view to show the button of the warning device of the present invention;

FIG. **5** shows the warning light is received in the button and the resilient member connected to the warning light extends out from the button;

FIG. **6**A shows the main circuit is connected and the button is removed for clarity purpose;

FIG. **6**B shows the warning device wherein the main circuit is connected and the button is pushed downward;

FIG. **7**A shows the main circuit is cut off and the warning light lights up, the button is removed for clarity purpose; and

FIG. **7**B shows the warning device wherein the main circuit is cut off and the button is moved upward and the warning light lights up.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

With reference to the drawings in particular to FIGS. **1** to **3**, the warning device **1** for a circuit breaker in accordance with the present invention comprises a casing **10**, a button **20** and a warning light **30**.

The casing **10** is a hollow casing so as to receive parts therein, a recess **11** is defined in the top of the casing **10** and the button **20** is up-and-down movably received in the recess **11**. The casing **10** includes a first slot **12** and a second slot **13**, and a cover **14** is connected to a rear opening of the casing **10** by bolts **15**.

The casing **10** includes at least two terminals. In this embodiment, the terminals include a first terminal **16** and a second terminal **17**.

The first terminal **16** extends through the first slot **12** and the second terminal **17** extends through the second slot **13**. The second terminal **17** includes a second contact point **171** and an extension portion **172** which extends toward interior of the casing **10**. A curved angle is defined in a lower portion of the extension portion **172**.

A bi-metallic plate **18** is an elastic strip and slightly curved. The bi-metallic plate **18** has a first end fixed to and electrically connected with an upper end of the first terminal **16**, and a second end being a free end. The free end of the bi-metallic plate **18** includes a first contact point **181** which is located corresponding to the second contact point **171**. When the bi-metallic plate **18** is heated, it bends to one side. When the bi-metallic plate **18** is cooled, it bends to the other side.

A hollow sleeve **23** is fixed to the casing **10** with its neck portion **231** engaged with the recess **11**. The button **20** is received in the sleeve **23** and can be moved through the sleeve **23**. In this embodiment, as shown in FIG. **4**, the button **20** includes a cap **21** and a shank **22** connected to the cap. The cap **21** is transparent or translucent. The cap **21** of the button **20** includes a reception space **210** in which the warning light **30** is accommodated and at least one protrusion **211** extending from an outside of the reception space **210**. The shank **22** includes at least one engaging slot **222** corresponding to the protrusion **211** and a top hole **220**. The engaging slot **222** is engaged with the protrusion, and the shank **22** is connected with the cap **21**. A first chamber **2201** and a second chamber **2202** are defined in a lower portion of the top hole **220**. An opening **2203** is defined at an outside of the shank **22** and communicated with the second chamber **2202**. A horizontal cut-off plate **221** is connected to the lower portion of the shank **22**. As shown in FIG. **5**, there are different ways to connect the cap **21** to the shank **22** such as by snap lugs, hooks or threaded connection.

The warning light **30** is disposed in the reception space **210** of the cap **21**. The warning light **30** includes a first leg **31** and a second leg **32**. A resistor **33** and a resilient member **34** are arranged and are arranged from the first leg **31** to the first terminal **16** in turn. One end of a connection plate **35** is connected to the second leg **32** and the other end of the connection plate **35** is a free end **351**. The free end **351** of the connection plate **35** extends toward the second terminal **17**.

The first leg **31**, the resistor **33** and the resilient member **34** are located within the first chamber **2201** of the shank **22**. The second leg **32** and the connection plate **35** are located within the second chamber **2202** of the shank **22**. The free end **351** of the connection plate **35** extends through the opening **2203** as shown in FIG. **5**.

In this embodiment, the connection plate **35** is a flexible plate and the free end **351** is a bent portion. The resilient member **34** is a compression spring which provides an upward force to the button **20**.

Referring to FIGS. **6**A and **6**B, when the user pushes the button **20** downward, the warning light **30** moves downward and the resilient member **34** is compressed to store the upward force. Before the button **20** is pushed downward, an original position of the insulating cut-off plate **221** is located between the first contact point **181** and the second contact point **171**. After the button **20** is pushed downward, the cut-off plate **221** is moved away from the original position between the first and second contact points **181**, **171**. Then the first contact point **181** pushed by the resilient bi-metallic plate **18** contacts the second contact point **171**, thereby a main circuit is formed via the first terminal **16**, the bi-metallic plate **18**, the first contact point **181**, the second contact point **171** and the second terminal **17**. In the meanwhile, the free end **351** of the connection plate **35** is separated from the extension portion **172** of the second terminal **17**. The circuit for the warning light **30** is cut off so that the warning light **30** is not activated.

Referring to FIGS. **7**A and **7**B, when overheat or overflow, the bi-metallic plate **18** bends to separate the second contact point **171** from the first contact point **181**. Thus, the main circuit is cut off. The button **20** and the warning light **30** are pushed by the resilient member **34** and the cut-off plate **221** is moved upward to the position between first and second contact points **181**, **171** to cut off the main circuit. In the meanwhile, the free end **351** of the connection plate **35** is in contact with the extension portion **172** of the second terminal **17** to form a weak current via the first terminal **16**, an extension end **341** of the resilient member **34**, the resilient member **34**, the resistor **33**, the first leg **31**, the warning light **30**, the second leg **32**, the connection plate **35**, the free end **351**, the extension portion **172** and the second terminal **17**. The warning light **30** activates and the light can be seen via the button **20**.

The warning light **30** is not activated when the main circuit is connected. The warning light **30** is activated only when the main circuit is cut off and a weak current is formed. The light signal of the warning light **30** informs the users that the main circuit is abnormal.

Although the present invention has been described with reference to the preferred embodiment thereof, it is apparent to those skilled in the art that a variety of modifications and changes may be made without departing from the scope of the present invention which is intended to be defined by the appended claims.

What is claimed is:

1. A warning device for a circuit breaker, comprising:

a casing;

a button including a cap and a shank connected to the cap, the button movably connected to the casing; and

a warning light located within the button and movable with the button, the warning light having a first leg and a second leg, a resistor and a resilient member connected to the first leg, a connection plate connected to the second leg, the resilient member electrically connected to a main circuit and providing an upward force to the button and the warning light when being compressed;

wherein when the main circuit is connected, the connection plate does not connect the main circuit and the warning light is not activated, when overheat or overload, the main circuit is cut off and a weak current circuit is formed via the resilient member, the resistor, the warning light and the connection plate, the warning light lights up.

2. The warning device as claimed in claim **1**, wherein the casing comprises a recess, the button is received in a hollow sleeve, the sleeve is fixed to the recess of the casing, the button is up-and-down movable within the sleeve.

3. The warning device as claimed in claim **1**, wherein the cap is a transparent or translucent cap.

4. The warning device as claimed in claim **1**, wherein

the shank includes a top hole, a first chamber and a second chamber are defined in a lower portion of the top hole, an opening defined in an outside of the shank and communicating with the second chamber;

one end of the connection plate is connected with the second leg and the other end of the connection is a free end;

the first leg, the resistor and the resilient member are located within the first chamber of the shank, the second leg and the connection plate are located within the second chamber of the shank, the free end of the connection plate extends through the opening.

5. The warning device as claimed in claim **1**, wherein the resilient member is a compression spring.

6. The warning device as claimed in claim **1**, wherein the cap includes a first screw thread and the shank includes a second screw thread corresponding to the first screw thread, the cap and the shank is connected by the first screw thread and the second screw thread.

7. The warning device as claimed in claim **1**, wherein the cap includes a hook and the shank includes a hole corresponding to the hook, the cap and the shank is connected by the hook and the hole.

8. The warning device as claimed in claim **1**, wherein the cap includes a reception space in which the warning light is accommodated.

9. The warning device as claimed in claim **8**, wherein the cap includes a protrusion extending from an outside of the reception space of the cap, and the shank includes an engaging slot with which the protrusion is engaged.

* * * * *